

REMARKS

Claims 1-8 and 21-28 are pending. Claims 1, 3-5, 21, and 23 have been amended. Claims 27 and 28 are newly presented. Reconsideration and allowance of the present application based on the following remarks are respectfully requested.

Claim Rejections under 35 U.S.C. § 103

A. Claims 1 and 2 were rejected under 35 U.S.C. § 103(a) over Lee (U.S. Patent No. 5,959,322) in view of Malik et al. (U.S. Patent No. 6,294,423). Applicants respectfully traverse this rejection.

Claim 1 recites, in part, a semiconductor device that includes an element substrate including a semiconductor layer of a first conductivity type being formed over a semiconductor substrate with a dielectric film interposed therebetween and such that the dielectric film is in contact with the semiconductor substrate and a groove formed therein with a depth extending from a top surface of the semiconductor layer into the dielectric film. The groove in the dielectric film is receded laterally as to expose a bottom surface of the semiconductor layer such that the width of said groove in the dielectric film is greater than that of the groove in said semiconductor layer. An impurity diffusion source is buried in the laterally receded portion of the groove to be contacted with only the bottom surface in a whole surface of the semiconductor layer. The Office Action and Advisory Action allege that Lee discloses the element substrate and the groove formed therein as recited in claim 1 and that Malik discloses an increased width portion. Applicants respectfully disagree.

Although the Office Action indicates that Lee discloses a semiconductor substrate 10, a dielectric film 20 and another semiconductor substrate 26, the dielectric film is not in contact with the semiconductor substrate, as recited in claim 1. Specifically, as shown in Figure 7, for example, the dielectric film 20, does not contact either of the substrates 10 or 26. Additionally, Lee does not teach that an impurity diffusion source is buried in the laterally receded portion of the groove to be contacted with only the bottom surface in a whole surface of the semiconductor layer. Although, Lee discloses an impurity region 32 that contacts substrate 10, the impurity region 32 is not contacted with only the bottom surface in a whole surface of the semiconductor substrate. Accordingly, Lee fails to teach or suggest a dielectric film that is in contact with the semiconductor substrate or an impurity diffusion source that is buried in the laterally receded portion of the groove to be contacted with only the bottom surface in a whole surface of the semiconductor layer, as recited in claim 1.

Malik does not remedy the deficiencies of Lee and further, Malik does not teach a groove that is receded laterally in the dielectric layer as to expose a bottom surface of the semiconductor layer. Referring to Figure 10 or Malik (as the Examiner did in the Office Action), Malik discloses a substrate 16 and a dielectric layer 18 (represented by layers 20 and 22). Malik further discloses trenches 30. The trenches are wider on the top than on the bottom. The trenches 30 are not receded laterally, as to expose a bottom surface of the semiconductor layer. In fact, Malik does not even show a semiconductor layer in Figure 10, he merely shows a substrate. Accordingly, Malik fails to teach or suggest, a groove that is receded laterally in the dielectric layer as to expose a bottom surface of the semiconductor layer.

Therefore, no combination of Lee and Malik teach or suggest the features recited in claim 1.

Claim 2 is believed allowable for at least the same reasons presented above with respect to claim 1 by virtue of its dependence upon claim 1.

Accordingly, Applicants respectfully request reconsideration and withdrawal of this rejection.

B. Claims 3 and 21 were rejected under 35 U.S.C. § 103(a) over Lee in view of Malik and Applicants' Prior Art Drawing (APAD). Applicants respectfully traverse this rejection.

Claim 21 is believed allowable for at least the same reasons presented above with respect to claim 1 because claim 21 also recites, in part, a semiconductor device which includes an element substrate including a semiconductor layer of a first conductivity type being formed over a semiconductor substrate with a dielectric film interposed therebetween and such that the dielectric film is in contact with the semiconductor substrate and a groove formed therein with a depth extending from a top surface of the semiconductor layer into the dielectric film. Claim 21 also recites that the groove in the dielectric film is receded laterally as to expose a bottom surface of the semiconductor layer such that the width of said groove in the dielectric film is greater than that of the groove in said semiconductor layer; and that an impurity diffusion source is buried in the laterally receded portion of the groove to be contacted with only the bottom surface in a whole surface of the semiconductor layer. APAD does not remedy the deficiencies of the combination of Lee and Malik discussed above.

Claim 3 is believed allowable for at least the same reasons presented above with respect to claim 1 by virtue of its dependence upon claim 1 and because APAD does not remedy the deficiencies discussed above with respect to the combination of Lee and Malik.

Accordingly, Applicants respectfully request reconsideration and withdrawal of this rejection.

C. Claims 6-8 and 24-26 were rejected under 35 U.S.C. § 103(a) over Lee in view of Malik, APAD, and Hieda et al. (U.S. Patent No. 5,508,541). Applicants respectfully traverse this rejection.

Claims 6-8 and 24-26 are believed allowable for at least the same reasons presented above with respect to claims 1 and 21 by virtue of their dependence upon claims 1 and 21 and because neither APAD nor Hieda remedies the deficiencies discussed above with respect to the combination of Lee and Malik. Accordingly, Applicants respectfully request reconsideration and withdrawal of this rejection.

New Claims

Claims 27 and 28 are newly presented and fully supported by the originally filed specification (see, for example, page 9, line 20 of the original specification). Additionally, claims 27 and 28 are believed to be allowable over the prior art of record for at least the reasons presented above with respect to claims 1 and 21 by virtue of their dependence upon claims 1 and 21, respectively.

Conclusion

Applicants appreciate the Examiner's indication that claims 4, 5, 22, and 23 contained allowable subject matter and would be allowable if rewritten in independent form. However, in view of the foregoing, all the claims are believed to be in form for allowance, and such action is hereby solicited. If any point remains in issue which the Examiner feels may be best resolved through a personal or telephone interview, please contact the undersigned at the telephone number listed below.

All objections and rejections having been addressed, it is respectfully submitted that the present application is in a condition for allowance and a Notice to that effect is earnestly solicited.

YAMADA et al. -- Appln. No. 09/993,967

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Respectfully submitted,
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